

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY
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Note to Readers: Pages 1-13 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 14.

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Item 1. World Leaders Discuss Environmental Security Policies at Davos

Business and political leaders exchanged ideas for addressing climate change, water shortages, conflict, terrorism, UN Millennium Development Goals, globalization, and new technologies at the World Economic Forum held in Davos, Switzerland, January 23-27, 2008. Japan's Prime Minister Yasuo Fukuda advocated new climate-change initiatives, including national CO₂ reductions for major emitters, increasing global energy efficiency 30% by 2020, and a new multilateral fund to mitigate climate change and to support developing countries to cope with global warming. He also announced that Japan—holding this year's G8 presidency—will place climate change at top of the July G8 summit agenda. U.N. Secretary-General Ban Ki-moon asked business and political leaders to make water issues and scarce supplies top priorities, citing environmental factors increasing and/or maintaining conflicts. Business leaders pledged millions of dollars for helping development and agriculture in poor countries by also improving the environment and water use and access. It was suggested that a certain amount of clean water for drinking should be seen as a human right, but water used for economic reasons should be priced to assure its efficient use.

Military Implications:

If clean water for human survival were to become a human right, how might military-to-military program priorities and training be altered to support that objective? The World Economic Forum conference has increased attention to environmental security cooperation between business and government. Military personnel with environmental security responsibilities should explore collaboration possibilities at the business-government interface to create roadmaps and design strategies to address the environmental aspects that might have security implications.

Sources:

World Economic Forum Annual Meeting 2008

<http://www.weforum.org/en/events/annualmeeting2008/index.htm>

Ban warns business on looming water crisis

<http://www.ft.com/cms/s/8ca7e9c6-cadb-11dc-a960-000077b07658.html>

Time is Running Out for Water (video)

http://gaia.world-television.com/wef/worldeconomicforum_annualmeeting2008/default.aspx?sn=22493&lang=en

Fukuda unveils new climate strategy

<http://search.japantimes.co.jp/cgi-bin/nn20080127a1.html>

Fukuda faces post-Kyoto balancing act

<http://search.japantimes.co.jp/cgi-bin/nn20080128a4.html>

Item 2. Iran and Iraq Sign Environment Protection Agreement

Iranian and Iraqi chief environment officials signed an agreement for increasing the two countries' cooperation in areas related to the environment. The eight-article document covers issues of natural resources, industrial and oil-exploitation pollution control, wildlife protection, and promoting ecotourism, as well as addressing environmental damage caused by wars.

Military Implications:

The Iranian–Iraqi environmental agreement might be another example where environmental diplomacy could foster peace in a conflict-torn region. U.S. military plans, training, and other military-to-military assistance should be updated to take this agreement into account.

Source:

Iran, Iraq ink agreement on environment protection

http://news.xinhuanet.com/english/2008-01/27/content_7506876.htm

Item 3. Israel to Participate in UNEP and UN HABITAT

The Western European and Others Group regional bloc within the UN elected Israel to represent the regional group in consultations with the UN Environmental Programme and the UN Human Settlements Programme (UN–HABITAT). This could create unique opportunities to address environmental security issues in the Palestinian territories, which are among the most severe in the world.

Military Implications:

Israel's participation in UNEP and UN–HABITAT deliberations might bring important environmental security benefits to the vulnerable Middle East region. Appropriate military liaisons should consider contacting their counterparts in the Israel Defense Forces to offer the benefit of US experience in the area of military participation in environmental security activities.

Source:

Israel gets seats on United Nations agency panels

<http://www.jpost.com/servlet/Satellite?cid=1198517288600&pagename=JPost%2FJPArticle%2FShowFull>

Item 4. Environmental-Security-Related Internet Resources**4.1 WHO Launched Website on Environmental Health in Emergencies**

The 'Environmental health in emergencies' website launched by the World Health Organization (WHO) provides information and resources for health management related to environmental disasters and emergency situations. Topics include: natural events, technological incidents, complex emergencies, prevention, preparedness and detection, and response and recovery. The subordinate web pages have links to websites and sources specific for different domains. WHO estimates that, in some countries, more than one third of the disease burden could be prevented through environmental improvements. [See also *World Health Organization: Stress Environmental Impact on Human Health* in June 2007 environmental security report.]

Military Implications:

AEPI and USACHPPM should review the site to see if there are military environmental health and environmental website links that should be linked with the WHO site. Relevant military health and planning personnel should be notified of the existence of the WHO 'Environmental health in emergencies' website as an additional resource for preventing and reducing health implications in case of disasters and emergencies, and for improving response capacity and collaboration, as well as for protecting U.S. troops from risks. The strategies outlined on the

WHO website should be reviewed for relevance to military operations and with the expectation that one day some elements might be included in future international agreements.

Source:

Environmental health in emergencies

http://www.who.int/environmental_health_emergencies/en/

4.2 Google to Support Development of Early Warning System in Vulnerable Regions

Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced \$25 million in grants aimed at addressing global challenges. One of the five core initiatives, 'Predict and Prevent' aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying 'hot spots' and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated \$5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University.

Military Implications:

Relevant military personnel should keep track of the grantees as potential collaborators to improve environmental security. A network of local communities that is able to "predict and prevent" crises could play important roles in enhancing environmental security. Someone at the Deputy Assistant Secretary level might contact Google.org to offer collaboration where possible to improve the effectiveness of grantees' efforts and to share insights.

Sources:

Google.org Announces Core Initiatives to Combat Climate Change, Poverty and Emerging Threats

http://www.google.com/intl/en/press/pressrel/20080117_googleorg.html

Google.org expands funding to attack world crises

<http://www.reuters.com/article/latestCrisis/idUSN17226771>

\$25 Million Begins Google's Charity

<http://www.washingtonpost.com/wp-dyn/content/article/2008/01/17/AR2008011703049.html>

Item 5. New Construction on Mediterranean Coastlines to be Banned

The recent meeting of the Barcelona Convention [for the Protection of the Marine Environment and the Coastal Region of the Mediterranean] added a new protocol on Integrated Coastal Zone Management to strengthen regional co-operation for harmonious and sustainable use of the Mediterranean coastal zone, including banning any construction within 100 meters (about 328 feet) to the water all along the Mediterranean shore. The participants also issued the Almería Declaration that requires all member states to catalog threatened marine species by 2011 and establish a network of protected coastal areas by 2012. To ensure that the convention's provisions are enforced, the first compliance system was established, and the parties agreed to create an enforcement committee. [See also *OSCE-NATO Workshop on Environmental Security in the Mediterranean* and *European Parliament Passed the Marine Strategy Directive* in December 2007 and other related items in previous environmental security reports.]

Military Implications:

Military personnel involved in environmental security issues and operations in the Mediterranean arena should study the new regulations and directives of the Barcelona Convention to ensure cooperative compliance with the new requirements in accordance with other agreements, such as international conventions and Status of Forces Agreements.

Sources:

Barcelona Convention and Mediterranean Action Plan: First-ever Legally-binding International Instrument on Coastal Zone Management Adopted

<http://www.unepmap.org/index.php?module=news&action=detail&id=30>

Barcelona Convention: Compliance System Established to Support Legal Framework and Actions

<http://www.unepmap.org/index.php?module=news&action=detail&id=28>

Mediterranean nations pledge restraints on coastal development

<http://www.csmonitor.com/2008/0122/p04s02-woeu.html>

Item 6. Environmental Courts Established in the Philippines

The Philippine Supreme Court has designated 117 trial courts as ‘environmental courts’ to hear cases involving violations of laws protecting the country’s natural resources and to speed up their resolution.

Military Implications:

Military personnel responsible for environmental compliance in the Philippines should become familiar with these new tribunals in order to assess their possible effects on environmental obligations related to military activities and to their contractors.

Source:

SC designates 117 environment courts

http://newsinfo.inquirer.net/inquirerheadlines/nation/view/20080114-112156/SC_designates_117_environment_courts

Item 7. Technological Breakthroughs with Environmental Security Implications**7.1 New Detection and Cleanup Technologies****7.1.1 New Approach May Ease Uranium Decontamination**

A new technique may lead to methods for removing dissolved uranium (e.g., from depleted uranium munitions) from liquids, such as groundwater. The method uses large organic molecules called macrocycles that essentially envelop a uranyl ion ($(\text{UO}_2)^{2+}$), leaving one of its oxygen atoms exposed, showing that the normally strong bond between the uranium and oxygen has been weakened. The scientists, Polly Arnold and Jason Love of the University of Edinburgh, believe “that the uranyl ion’s bonds can be loosened is a first step towards finding substances that can transform dissolved uranyl into an insoluble compound.” The macrocycle is destroyed by water, so further work will be necessary to produce a practical decontamination technique.

Military Implications:

The military should follow this research in order to be ready to apply any resulting practical methods to post-conflict environmental cleanup.

Sources:

'Pac-Man' molecule chews up uranium contamination

<http://environment.newscientist.com/article/mg19726396.200?DCMP=NLC-nletterbanner&nsref=mg19726396.200>

7.1.2 Miniature Chemical Agent Sensor

Gas chromatography and mass spectrometry devices for detection of various dangerous gases are being further reduced in size, while their sensitivity and rapidity of reaction is increasing. The prototype of a new tiny device produced results in about four seconds from minimal gas amounts and operates on limited amounts of power. The sensor, developed by researchers from MIT, Cambridge University, University of Texas at Dallas, Clean Earth Technology and Raytheon, is expected to be completed in the next two years.

7.1.3 Model Helps Evaluate Performance of Biosensors

A new modeling technique allows the study of miniature biosensors used to identify pathogens, DNA or other substances. The technique, developed by scientists of the School of Electrical and Computer Engineering at Purdue University, comprises a new conceptual framework and corresponding computational model to relate the shape of a sensor to its performance and explain why certain designs perform better than others.

Military Implications:

The military should explore these research programs for their potential use in improving environmental analysis.

Sources:

MIT gas sensor is tiny, quick. Energy-efficient device could quickly detect hazardous chemicals

<http://web.mit.edu/newsoffice/2008/micro-analyzer-0110.html>

Model Is First to Compare Performance of 'Biosensors'

<http://www.sciencedaily.com/releases/2008/01/080102134121.htm>

7.2 Increasing Energy Efficiency Technologies**7.2.1 New Capacitor Promises 10× Improvement over Batteries in Charge/Weight Ratio**

Lockheed Martin has signed an agreement with EESor of Cedar Park, Texas for the military applications of a new type of ultracapacitor based on barium titanate that Lockheed Martin believes will be able to hold 10 times the energy or 1/10th the weight of typical batteries.

7.2.2 Bacteria-Generated Electricity from Waste to Power Fuel Cell

Microbial fuel cell technology, being developed by scientists from Arizona State University's Biodesign Institute, is based on the use of bacteria to convert a variety of liquid organic waste (such as sewage or pig manure) into electricity.

7.2.3 New Sunshine Distribution System Provides Energy-free Lighting

The Solatube system collects sunlight from a rooftop unit and distributes it to interior spaces through specially designed optical tubes, eliminating the need for external power for illumination when daylight is sufficient.

7.2.4 Converting CO₂ into Fuels using Sunshine

The Sunlight to Petrol (S2P) project developed by researchers at Sandia National Laboratories in New Mexico is using sunlight to convert CO₂ into fuels like methanol or gasoline. Although the

innovation seems to be working, large-scale implementation could take 15-20 years to reach industrial scale.

7.2.5 New Project for Nanowire Solar Cells

The Department of Engineering Physics at McMaster University in Hamilton ON, Cleanfield Energy, and the Ontario Centres of Excellence (OCE) have formed a partnership for a three-year project to pursue the commercialization of nanowire technology in the production of more affordable solar cells.

Military Implications:

The military should investigate these developments for their positive energy-saving effects on the environmental footprint of military installations and utility in deployable systems (esp. 7.2.1, 7.2.3, 7.2.4. and 7.2.5). DOD is aware of the Sunlight to Petrol (S2P) project through its funding of the project by DARPA; however, it is included to notify the broader environmental security community.

Sources:

Lockheed Martin Signs Agreement with EESor

<http://www.gm-volt.com/2008/01/10/lockheed-martin-signs-agreement-with-eestor>

Bacteria used to power fuel cell

http://www.upi.com/NewsTrack/Science/2008/01/04/bacteria_used_to_power_fuel_cell/8011/

New insights into fuel cell that uses bacteria to generate electricity from waste

<http://www.biodesign.asu.edu/news/new-insights-into-fuel-cell-that-uses-bacteria-to-generate-electricity-from-waste>

Solatube International, Inc.: <http://www.solatube.com/commercial/faqs.php>

Solatubes: Power-free lighting solution

http://www.enn.com/top_stories/article/28447

Sandia's Sunshine to Petrol project seeks fuel from thin air

<http://www.sandia.gov/news/resources/releases/2007/sunshine.html>

Nanowires hold promise for more affordable solar cells

<http://www.physorg.com/news120474984.html>

Item 8. Vanishing Supply of World's Helium Calls for Conservation

The world's largest reserve of helium may be depleted in as short a time as eight years, experts say; they also point out that the gas is non-renewable and irreplaceable. It has a number of applications in science and technology, and in industry, e.g., nuclear magnetic resonance, mass spectroscopy, welding, fiber optics and computer microchip production. Helium is found in some natural gas reservoirs, and Russia may be a future supplier. Its separation from the atmosphere is prohibitively expensive.

Military Implications:

The military should conserve the supply of helium and seek substitutes and less expensive methods for its production. Recovery and recycling programs should also be considered by the military and civilian contractors.

Source:

Helium Supplies Endangered, Threatening Science and Technology

http://www.enn.com/top_stories/article/28495

Item 9. Updates on Previously Identified Issues**9.1 European Commission's New Low-carbon 20/20/20 by 2020 Energy Plan**

The European Commission has proposed a package of measures to reach its “20/20/20 by 2020” targets — produce 20% of its energy from renewable sources and increase energy efficiency by 20%, cut greenhouse gas emissions by 20% of 1990 levels (or 30% in case of a global accord), and considerably reduce reliance on energy imports. The detailed roadmap includes specific renewable energy and CO₂ emission targets for each EU member state; new rules for carbon sequestration; and an updated Emissions Trading System for fair greenhouse gas emissions cuts for different emitters, with the aim of gradually including all industries in the emissions auction scheme. The Commission's proposals have to be endorsed by the European Council and Parliament, with the final package expected to come into force by the end of 2009. The European Commission hopes that the plan will trigger strong momentum towards a global agreement. Meantime, the European Commission is also considering introducing a climate tax on imports from states failing to tackle greenhouse gas emissions, and toughening EU's emission trading system. [See also *EU Energy and Climate Change Policy* in March 2007 environmental security report.]

Military Implications:

The military should follow the outcomes of these proposals that might result in new environmental regulations and new standards policies, and consequently emerging strategies. The aim would be to ensure that military activities could adjust to any new requirements in Europe.

Sources:

José Manuel Durão Barroso, President of the European Commission 20 20 by 2020: Europe's Climate Change Opportunity Speech to the European Parliament, Brussels, 23 January 2008
<http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/34&format=HTML&aged=0&language=EN&guiLanguage=en> (Free registration required.)

Stavros DIMAS, Member of the European Commission, responsible for environment Climate action, Energy for a changing world, Press conference, Wednesday, 23 January 2008
<http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/37&format=HTML&aged=0&language=EN&guiLanguage=en> (Free registration required.)

EU unveils comprehensive climate and energy package

<http://euobserver.com/9/25513/?rk=1>

Brussels considering climate tax on imports

<http://euobserver.com/9/25400/?rk=1>

9.2 Waste Export Regulations Revised and Tightened

The ‘Green’ list of the Waste Shipment Regulation, which controls the movement of non-hazardous recyclable waste within, into, or out of the EU, has been updated to better protect the non-OECD countries against receiving from wealthier nations materials they do not want or cannot process in an environmentally sound way. The Revised Green List Regulation 1418/2007

came into effect on 18 December 2007 with a transition period of 60 days for certain wastes and countries. The complementary changes to the UK Transfrontier Shipment of Waste Regulations will come into effect on 5 February. [See also *EU Waste Shipment Legislation Came into Force* in July 2007 and other related items in previous environmental security reports.]

Military Implications:

[Same as previous on related issues] The regulation on transboundary shipments of waste doesn't seem to have exceptions for the military; hence, relevant military personnel should comply with the new regulation, as appropriate under Status of Forces Agreements.

Sources:

Trade and environment. Shipment of non-hazardous waste to certain non-OECD countries:
Green list waste

<http://ec.europa.eu/trade/issues/global/environment/waste.htm>

Regulation (EC) No 1418/2007

<http://trade.ec.europa.eu/doclib/html/136966.htm>

Waste exports: better protection for developing countries

<http://www.defra.gov.uk/news/2008/080111a.htm>

Improved protection on waste exports for developing countries

<http://www.morethanwaste.com/Site/Default.aspx/7B662DEFBE639810F0F4>

9.3 Restrictions on Plastic Bags Expanding

More than 40 jurisdictions around the world have imposed or are considering restrictions or taxes on plastic bags. China is outlawing plastic bags from all public transportation, prohibits their free distribution at shopping points, bans the production and use of ultra-thin (less than 0.025 mm) non-biodegradable plastic bags, and will establish new criteria for the production of plastic bags. Firms not complying will face penalties. The new regulation will come into effect on June 1, 2008. Similar regulations were introduced in Bangladesh, Uganda, and South Africa. The Australian Federal Environment Minister announced intentions to phase out plastic bags by the end of the year and, according to UNEP, the problem is also on the agenda of almost every African country. [See also *Plastic Bags Taxed and/or Banned* in October 2005 environmental security report.]

Military Implications:

The military should review its usage of plastic bags (especially the thinnest varieties) and plan for their eventual replacement. This would apply primarily to commissaries and PXs, but could extend to convenience uses for other functions.

Sources:

Plastic bag ban

http://www.chinadaily.com.cn/opinion/2008-01/10/content_6383869.htm

China boosts global war against menace of the plastic bag

<http://www.guardian.co.uk/environment/2008/jan/12/plasticbags.recycling>

China bans plastic shopping bags

<http://www.cbc.ca/consumer/story/2008/01/08/china-bags.html>

Retailers oppose bag ban

<http://www.stuff.co.nz/4354751a13.html>

China bans free plastic bags

<http://edition.cnn.com/2008/WORLD/asiapcf/01/09/china.plastic.bags/index.html>

9.4 Sonar Restrictions Debate Continues

Earlier in January, a U.S. District Court judge in Los Angeles ordered clear rules for the U.S. Navy's training with mid-frequency sonar off the coast of Southern California. The restrictions include: a minimum 12-nautical-mile no-sonar zone along the California coastline; shutdown of sonar when marine mammals are spotted within 2,200 yards; mandatory monitoring for marine mammals one hour prior to sonar exercises; and aerial surveillance prior to and during the exercise. However, later in the month, President Bush overruled the Court's decision and signed an exemption for the Navy to use sonar in its training, then a federal judge temporarily lifted certain measures, and the Navy has resumed sonar training off the coast of Southern California. [See also *U.S. to Study Sonar Impact on Marine Mammals* in May 2007, and other previous environmental security reports on the same issue.]

Military Implications:

Although this time overruled, the California Court's decision might be reinstated and more research, circumstantial evidence, and increasing advocacy from conservation groups that sonar is harmful, might trigger negotiations for a general ban. Also, the Court's ruling sets a precedent that might be expanded to other regions. If not already being done, preparation monitoring of marine mammals' presence in case of sonar use should become incorporated in Navy policy to allow for responsiveness in the event that further oscillations of policy were to occur.

Sources:

Ruling curbs Navy sonar off Calif. Coast

http://www.upi.com/NewsTrack/Top_News/2008/01/04/ruling_curbs_navy_sonar_off_calif_coast/3754/

Judge orders Navy to stay 12 miles off coast when using sonar

<http://www.signonsandiego.com/news/metro/20080103-1643-bn03sonar.html>

Bush exempts Navy from no-sonar rule

http://www.usatoday.com/news/washington/2008-01-16-navysonar_N.htm?csp=34

State files another challenge to Navy's sonar training off coast

<http://www.signonsandiego.com/news/military/20080122-2122-bn22sonar.html>

Navy resumes sonar training off SD coast as legal battle goes on

<http://www.sfgate.com/cgi-bin/article.cgi?f=/n/a/2008/01/27/state/n162935S45.DTL>

9.5 Whale Conservation Protected Efforts Increasing

The U.S. National Marine Fisheries Service has released its recovery plan for Puget Sound's endangered killer whales. The plan covers about 2500 square miles, including the waters around the San Juan Islands, the Strait of Juan de Fuca and all of Puget Sound. One of its aspects includes assessing and improving vessel traffic guidelines in and around protected areas.

Japan continues its whaling in waters off a section of Antarctica that Australia declared a whale sanctuary and over which it claims sovereignty. In January, an Australian Federal Court declared that whaling in the sanctuary was illegal and should stop. Australia's new Prime Minister, Kevin Rudd, also calls for an end to whaling and New Zealand Prime Minister Helen Clark warned that photos of the Japanese whaling fleet revealing their location would be published if they entered New Zealand's Antarctic waters.

A Pew Whale Symposium, entitled "A change in climate for whales," was held at UNU Headquarters in Tokyo, Japan, January 30-31, 2008, as a prelude to an intersessional meeting on strengthening the International Whaling Commission, to be held March 6-8, 2008, in London.

[See also *Shipping Regulations for Protecting Whales* in September 2007, *New Marine Protected Areas Proposed* in March 2007, *Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)* in June 2007, and other items on similar issues in previous monthly reports.]

Military Implications:

Military operating in marine regions designated as conservation areas should increase vigilance and be prepared for new restrictions on activities that might threaten marine endangered species.

Sources:

Puget Sound Orca Recovery Plan Released

<http://www.physorg.com/news120453628.html>

Salty shepherds. The Economist, Jan 24th 2008

http://www.economist.com/world/asia/displaystory.cfm?story_id=10566770

New Zealand PM Warns Off Japanese Whalers

<http://www.planetark.com/dailynewsstory.cfm/newsid/46633/story.htm>

A Change in Climate for Whales. Second Pew-Sponsored Whale Symposium

<http://www.pewwhales.org/tokyosymposium/>

Intersessional Meeting on the future of the IWC, London, 2008

<http://www.iwcoffice.org/meetings/intersession.htm>

9.6 Climate Change

As international attention to climate change escalates, the events related to it increase. Following is a short summary of the events considered most important this month, with an elaboration available in the [Appendix](#).

9.6.1 Intensified Disasters

The number of people affected by natural disasters in 2007 reached 200 million, considerably higher than the 135 million in 2006. Flooding affected the most people and has been the deadliest. Asia was the region most touched by climatic disasters, but, overall, the U.S. experienced the highest number of natural disasters (22), ahead of China (20) and India (18). Flooding in Zambia, Mozambique, Zimbabwe and Malawi, displacing thousands of villagers devastated the largely agriculture-based economies of the region. Australian meteorologists suggest that the country's weather patterns are changing and that stronger storms, droughts, and higher temperatures might become the norm.

9.6.2 Melting Glaciers and Sea Ice

Atmospheric heat moving towards the North Pole may be an accelerating factor of Arctic warming.

Ice loss in Antarctica increased by 75% in the last 10 years and Antarctica is losing almost as much ice as Greenland, according to satellite data (1996-2006). Total loss of ice from Antarctica in 2006 was enough to raise the global sea level by 0.5 mm.

In September 2007 the Arctic ice cap had shrunk to 4.13 million square kilometers (1.6 million square miles), down from 5.3 million square kilometers in 2005; 2008 might be a critical year and could result in the loss of another million square kilometers.

The IPCC is inviting scientists to submit material on both Antarctic and Greenland ice sheets, to gather information and assess potential consequences to be addressed in an eventual IPCC fifth report.

9.6.3 Rising Sea Levels

A forecast model shows that costal erosion might increase 2-5 times over the next 50 years due to rising sea levels and more powerful storms. One of the most affected areas seems to be the East Arctic coast, which might lose 5 to 15 meters per year in 2040-2045. Russia's coastline is seriously affected by thermal abrasion (permafrost loss); the annual retreat reaching 15 meters in some places.

Along China's coastline, sea levels have risen by an average of 9 centimeters (3.54 inches) over the past 30 years, the northern part being the most affected.

The situation of the small islands of Tuvalu becomes increasingly critical, as forecasts indicate higher tides and the seawater surging up through the coral is salinizing the soil and groundwater.

The level of the Mediterranean is rising and could increase by another 0.5 meter in the next 50 years, producing "catastrophic consequences." Mediterranean water temperatures also rose by 0.12 to 0.5 degrees Celsius since the 1970s.

9.6.4 Adaptation

In Australia, where drought might become the rule and fresh water is already scarce, nearly every major coastal city has a desalination plant. Some, like Perth, make almost all fresh water from the ocean, and Melbourne and Sydney will soon desalinate about 20% of their water supply. The energy required by desalination will be mostly green.

Over half of the Republic of Maldives' 200 inhabited islands are eroding at an alarming rate, in some cases forcing relocation of entire island communities. Adaptation actions have begun with the construction of a new artificial taller island, Hulhumale.

Military Implications:

[Same as previous on similar issues] Increasingly more compelling evidence and warnings on climate change amplify international discourse and increase the emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects. Hence, the military should be doing its part in reducing greenhouse gas emissions and preparing to help mitigate the human-made and natural catastrophes that could ensue.

Sources: (see a more expanded list in the [Appendix](#))

Natural disasters taking greater global toll, UN report

http://news.yahoo.com/s/afp/20080118/sc_afp/worlddisastersenvironment

Mozambique Floods Could be Worst in Memory – UN

<http://www.planetark.com/dailynewsstory.cfm/newsid/46470/story.htm>

Australian climate changing, experts say

http://www.terradaily.com/reports/Australian_climate_changing_experts_say_999.html

Australia floods strand thousands

<http://news.bbc.co.uk/2/hi/asia-pacific/7174377.stm>

Arctic Warming Faster Above Ground Level, Study Finds

<http://news.nationalgeographic.com/news/2008/01/080102-arctic-warming.html>

Antarctic Ice Loss Speeds Up, Nearly Matches Greenland Loss

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Arctic ice-cap loss twice the size of France: research

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UN Climate Chief to Visit Antarctica

http://ap.google.com/article/ALeqM5iQmBUIYskvnKT0CLHBucXxY5_wKAD8U1UQ200

Global warming continues to erode Arctic coast. RIA Novosti, January 25, 2008

<http://en.rian.ru/analysis/20080125/97753436.html>

Rising Seas Threaten China's Sinking Coastal Cities

<http://news.nationalgeographic.com/news/2008/01/080117-AP-china-risin.html>

Tuvalu struggles to hold back tide

<http://news.bbc.co.uk/2/hi/science/nature/7203313.stm>

Warning on rising Med Sea levels

<http://news.bbc.co.uk/1/hi/sci/tech/7197379.stm>

Under dry sky, Aussies turn to the sea

http://marketplace.publicradio.org/display/web/2008/01/27/planb_mmr1_desalination

Maldives Builds Barriers to Global Warming

<http://www.npr.org/templates/story/story.php?storyId=18425626>

9.7 Nanotechnology Safety Issues

9.7.1 Conference on Nanotechnology Law, Regulation and Policy

The First Annual Conference on Nanotechnology Law, Regulation and Policy will be held February 28-29 in Washington, DC. The conference will include discussions of whether the FDA will implement its Nanotechnology Task Force Report, how OSHA will address nanotechnology-related issues in the workplace, and how the European and Asian approaches to nanotechnology regulation differ from that of the U.S. The conference is co-sponsored by the Food and Drug Law Institute, and the Woodrow Wilson International Center for Scholars Project on Emerging Nanotechnologies, in partnership with Arizona State University and the Burdock Group.

9.7.2 UK Launches New Nanotechnology Environmental Service

The UK Institute of Occupational Medicine's SAFENANO Information Service and Community Portal has set up SAFENANO Scientific Services to provide multidisciplinary risk management solutions to companies operating in the nanotechnology industry. The services, planned to assist with safety issues ranging from employees' working conditions to end products, include training, laboratory tasks, and toxicology information update.

Military Implications:

[Same as previous on similar issues] Relevant military personnel should review the information generated by such activities to improve military and contractor practices, as well as to assist and cooperate with the organizations working on those issues for enriching their studies.

Sources:

1st Annual Conference on Nanotechnology Law, Regulation and Policy

<http://www.fdpi.org/conf/431/>

SAFENANO - The UK's premier site for information on Nanotechnology health and safety

<http://www.safenano.org>

SAFENANO officially launches SAFENANO Scientific Services

<http://www.safenano.org/SingleNews.aspx?NewsID=297>

Item 10. Reports Suggested for Review

10.1 *An Uncertain Future: Law Enforcement, National Security and Climate Change*

[See a more detailed review in the [Appendix](#)] *An Uncertain Future: Law Enforcement, National Security and Climate Change* is a comprehensive analysis of the security implications of climate change, including some recommendations. It warns that “traditional attempts to maintain the status quo and control insecurity” is doomed to failure and calls for increased research to identify areas of highest vulnerability and instability, consider climate change in foreign aid programs, and change strategies from reactive to proactive in order to prevent and manage security issues triggered by climate change. Unrest could affect developing as well as developed countries, ranging from protests against polluting companies and government inaction to new forms of ecoterrorism (although the author considers the term misleading). Recommendations include changes in “Policing new legislation” and “important operational and strategic concerns that military planners will need to consider over the coming decades”.

Military Implications:

Relevant military personnel should study the report for its comprehensive analysis and the multi-faceted perspective of security implications of climate change, including changes in planning, funding and priorities.

Sources:

An Uncertain Future: Law Enforcement, National Security and Climate Change

http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/uncertainfuture.php

http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/uncertainfuture.pdf (report)

New security threats caused by climate change

<http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/01/23/eacclimate123.xml>

Armed Forces Face Strain of Climate Change – Report

<http://www.planetark.com/dailynewsstory.cfm/newsid/46590/story.htm>

10.2 IAEA Nuclear Terror Prevention Guide

The International Atomic Energy Agency published a new manual, *Combating Illicit Trafficking in Nuclear and Other Radioactive Material*, to help harmonize the activities of the organizations involved in the process of detecting and/or responding to nuclear terror-related incidents. The 156-page manual is a cooperative effort of Interpol and the World Customs Organization.

Military Implications:

Relevant military personnel should review the guide as a source of inputs to their own work and cooperation with counterparts worldwide.

Source:

IAEA Publishes Advisory Guide to Address Nuclear Terror Threat

<http://www.iaea.org/NewsCenter/News/2008/guideterrorthreat.html>

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

9.6 Climate Change

This is a bit more elaboration on the events considered most important this month.

9.6.1 Intensified Disasters

The number of people affected by natural disasters in 2007 reached 200 million, considerably higher than the 135 million in 2006, according to the annual study by the Belgian research center Centre for Research on the Epidemiology of Disasters (CRED) of the Catholic University of Louvain. Except for the August earthquake in Peru, the ten deadliest disasters were all climatic, with flooding affecting the most people and being the deadliest. Asia was the region most touched by climatic disasters, but overall, the U.S. experienced the highest number of natural disasters (22), ahead of China (20) and India (18).

Heavy rains for several weeks caused heavy flooding in Zambia, Mozambique, Zimbabwe and Malawi, displacing thousands of villagers and devastating the largely agriculture-based economies of the region. The UN noted that the Mozambique floods could be the worst in memory.

Australian meteorologists suggest that the country's weather patterns are changing and that stronger storms, droughts, and higher temperatures might become the norm. Statistics show that 2007 was the warmest year on record for New South Wales and the Murray-Darling Basin, and the 11th year in a row experiencing above normal temperatures and the 7th with below-average rain, with the southeast of Australia facing the worst drought in living memory.

9.6.2 Melting Glaciers and Sea Ice

Modifications of atmospheric energy transport, heat moving toward the North Pole, and changes in the vertical temperature structure might represent the accelerating factor of the Arctic warming, reveals the article *Vertical structure of recent Arctic warming* by a group of scientists from the Department of Meteorology, Stockholm University, Sweden, published in *Nature*. In recent decades, the near-surface Arctic temperature rise was almost double the global average, and the study found that during the summer, the Arctic upper atmosphere was warming up twice faster each decade, thus accelerating thawing of sea ice and snow. Increasing GHG emissions seems to be an influencing factor of the atmospheric heat transport.

Antarctica is losing almost as much ice as Greenland, according to data gathered by an international satellite network measuring the thickness of the glaciers. Analyzing 10 years data (1996-2006), the international team led by Eric Rignot of NASA's Jet Propulsion Laboratory, Pasadena, CA, found that ice loss in Antarctica increased by 75% in the last 10 years. Mapping patterns of ice loss on a glacier-by-glacier basis, they remark that West Antarctica lost about 49 billion metric tons more ice in 2006 than the approximately 83 billion metric tons in 1996, and that total loss of ice from Antarctica in 2006 was enough to raise global sea level by 0.5 mm.

In September 2007 the Arctic ice cap had shrunk to 4.13 million square kilometers (1.6 million square miles), down from 5.3 million square kilometers in 2005, a loss about twice the size of France, notes Jean-Claude Gascard, coordinator of the European scientific mission Damocles, which is monitoring the effects of climate change across the Arctic. 2008 might be a critical year and could result in the loss of another million square kilometers, he added.

The IPCC is inviting scientists to submit material on both Antarctic and Greenland ice sheets, given the huge effect their potential simultaneous melting might have on sea level raise. The aim is to gather information and evidence on the impact of global warming at the poles, and to assess potential consequences to be addressed in an eventual IPCC fifth report.

9.6.3 Rising Sea Levels

A forecast model shows that coastal erosion might increase 2-5 times over the next 50 years due to rising sea levels and more powerful storms. One of the most affected areas seems to be Russia's East Arctic coast, which might lose 5 to 15 meters per year in 2040-2045. Russia is already recording high retreat along its 50,000-km northern coastline because of permafrost melt and Arctic Ocean rising levels, waves and tides and subsequent thermal abrasion. About 33% of Russia's eastern Arctic coast also suffers from thermal abrasion. In some places, the coast's annual retreat reaches 15 meters.

Along China's 18,000-km (11,185 miles) coastline, sea levels have risen by an average of 9 centimeters (3.54 inches) over the past 30 years, and coastal waters are getting slightly warmer, reports the country's State Oceanic Administration. The most affected is the northern part, where, over the same period, sea level rise reached 19.6 centimeters (7.72 inches) at Tianjin port city, and 11.5 centimeters (4.53 inches) at Shanghai, causing increasingly huge problems in highly populated areas. Meanwhile, the *China 2007 Sea Environmental Quality Report* reveals increased pollution of coastal waters as a result of human activity.

The situation of the small islands of Tuvalu becomes increasingly critical. While the highest point of the islands is barely over 4 meters, a typical high tide reaches about 2 1/2 meters and a King Tide can be over 3 meters high; the forecast is that they will get higher due to global warming. The seawater is also surging up through the coral that forms the islands, salinizing the soil and groundwater.

The level of the Mediterranean is rising rapidly and could produce "catastrophic consequences", warns the study *Climate Change in the Spanish Mediterranean* by the Spanish Oceanographic Institute. Since 1990, the study estimates that the Mediterranean has risen between 2.5 and 10 millimeters (0.1 and 0.4 inches) per year, meaning that if present trends continue, the water levels will rise between 12.5 centimeters (5 inches) and 0.5 meter (20 inches) in around 50 years. Mediterranean water temperatures also rose by 0.12 to 0.50 degrees Celsius since the 1970s.

9.6.4 Adaptation

Scientists are increasing efforts to assess the 'hot spots' that will be most affected by climate change in order to orient policy making and businesses to help those areas to adapt and cope with new challenges. Investors are already funding projects ranging from new agriculture practices and flood defense systems to renewable energy sources. In Australia, where drought might become the rule and fresh water is already scarce, nearly every major coastal city has a desalination plant, with some, like Perth, with almost all fresh water coming from the ocean, and Melbourne and Sydney soon to desalinate 20%. The energy required by desalination will be mostly green.

Over half of the Republic of Maldives' 200 inhabited islands are eroding at an alarming rate, in some cases forcing relocation of entire island communities. Adaptation actions began already, by raising a massive seawall made of concrete tetrapods that surrounds the entire capital of Malé, and even constructing new artificial, taller islands, such as Hulhumalé.



Sources: (more expanded list)

Natural disasters taking greater global toll, UN report

http://news.yahoo.com/s/afp/20080118/sc_afp/worlddisastersenvironment

Zambia Declares Flood Disaster, Rains Lash Region

<http://www.planetark.com/dailynewsstory.cfm/newsid/46537/story.htm>

Mozambique Floods Could be Worst in Memory – UN

<http://www.planetark.com/dailynewsstory.cfm/newsid/46470/story.htm>

Zimbabwe's Heavy Rains a Disaster for Farming

<http://www.ens-newswire.com/ens/jan2008/2008-01-20-03.asp>

This drought may never break

<http://www.smh.com.au/news/environment/this-drought-may-never-break/2008/01/03/1198949986473.html>

Australian climate changing, experts say

http://www.terradaily.com/reports/Australian_climate_changing_experts_say_999.html

Australia floods strand thousands

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Vertical structure of recent Arctic warming. *Nature* 451, 53-56 (3 January 2008)

<http://www.nature.com/nature/journal/v451/n7174/full/nature06502.html> (abstract)

Arctic Warming Faster Above Ground Level, Study Finds

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West Antarctica Ice Decreases

<http://pubs.acs.org/cen/news/86/i03/8603notw1.html>

Antarctic glaciers melting more quickly

<http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/01/26/MN50UM20C.DTL>

Antarctic Ice Loss Speeds Up, Nearly Matches Greenland Loss

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Arctic ice-cap loss twice the size of France: research

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Global warming continues to erode Arctic coast. RIA Novosti, January 25, 2008

<http://en.rian.ru/analysis/20080125/97753436.html>

Rising Seas Threaten China's Sinking Coastal Cities

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Tuvalu struggles to hold back tide

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Spanish study warns of rising Mediterranean sea levels

http://www.terradaily.com/reports/Spanish_study_warns_of_rising_Mediterranean_sea_levels_999.html

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Maldives Builds Barriers to Global Warming

<http://www.npr.org/templates/story/story.php?storyId=18425626>

Item 10. Reports Suggested for Review

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An Uncertain Future: Law Enforcement, National Security and Climate Change is a comprehensive analysis of the security implications of climate change, including some recommendations. It warns that “traditional attempts to maintain the status quo and control insecurity” and use “military force to secure resources overseas, while attempting to create a fortress state at home” are doomed to failure. Mentioning “almost certain” future mass movement of 200 million people by 2050 due to climate change, the report calls for an international legal framework for environmental refugees’ management. Climate change has the potential to change the geographical and political world map and in addition to being a “threat multiplier” in already vulnerable areas like the Horn of Africa and the Persian Gulf, it could also cause civil unrest in developed countries of North America and Europe. Increased research is needed to identify areas of highest vulnerability and instability and to consider climate change in foreign aid programs. Military and police will have to change from reactive to proactive strategies in order to prevent and manage security issues triggered by climate change. Unrest could range from protests against polluting companies and government inaction to new forms of ecoterrorism (although the author considers the term misleading).

Recommendations include changes in “Policing new legislation” and “important operational and strategic concerns that military planners will need to consider over the coming decades:

1 Difficulties maintaining military capability; 2 Loss of strategic defence assets; 3 Greater calls for peacetime deployments; 4 Instability in strategically important regions.” A whole chapter covers “Implications for National Security and the Military”, including “Difficulties maintaining military capability; Loss of strategic defence assets; Greater calls for peacetime deployments; and Instability in strategically important regions.” The report concludes: “The risks of climate change demand a rethink of approaches to security.”

The report is authored by Chris Abbott of Bristol University's Centre for Governance and International Affairs, published by Oxford Research Group “building bridges for global security.”

Sources:

An Uncertain Future: Law Enforcement, National Security and Climate Change

http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/uncertainfuture.php

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